

# Conceptual Sampling Plan

## UCR Mussel Toxicity Testing

### 1.0 Introduction

The goal of this sampling program is collect 40 large-volume (12 L) sediment samples from the Upper Columbia River, representing a gradient of COPC metal concentrations and slag contents. These sediment samples will be evaluated using 28-d whole-sediment toxicity tests with freshwater mussels (*e.g., Lampsilis siliquoidea*), 28-d whole-sediment toxicity tests with amphipods (*Hyaella azteca*), and 10-d toxicity tests with midges (*Chironomus dilutus*). In addition, longer-term whole sediment toxicity tests will be conducted with amphipods (i.e., 42-d exposures) and midge (13-d exposures) on a subset of the 40 sediment samples (i.e., 10 to 12 samples) to evaluate relative endpoint sensitivity. All of the sediment samples will be characterized relative to grain size, total organic carbon, total metals, simultaneously extracted metals (SEM), and acid volatile sulfides (AVS). Pore water samples obtained from peepers placed in chemistry-only exposure chambers or by centrifugation of whole sediment -samples will be characterized relative to dissolved metals, dissolved organic carbon, major anions, major cations, pH, hardness, alkalinity, and conductivity. Splits of sediment samples collected in the field will be prepared for possible future analysis of slag content (by backscatter imaging) and organic contaminants.

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Comment [CGI1]: Explain the deferred whole sediment chemistry here too?

### 2.0 Selection of Sampling Stations

There is limited data available on the chemistry of UCR sediments. For this reason, it is difficult to accurately predict COPC concentrations that may be encountered at any specific sampling location. Accordingly, a flexible sampling strategy will be employed to support the collection sediment samples with the following characteristics:

- \$ Reference Sites (n=6): mean PEC-Q < 0.1; mean PEC-Q<sub>metals</sub> < 0.2;
- \$ Low-metals Sites (Non-slag affected; n=8): mean PEC-Q = 0.1 to 0.5; mean PEC-Q<sub>metals</sub> = 0.2 to 1.0; SEM-AVS < 1.7; SEM-AVS/foc < 130;
- \$ Moderate-metals Sites (Possibly-slag affected; n=13): mean PEC-Q = 0.5 to 2.5; mean PEC-Q<sub>metals</sub> = 1.0 to 5.0; SEM-AVS = 1.7 to 120; SEM-AVS/foc 130 to 3000; and,

§ High-metals Sites (Slag affected; n=13): mean PEC-Q > 2.5; mean PEC-Q<sub>metals</sub> > 5.0; SEM-AVS > 120; SEM-AVS/foc >3000.

Reference sediment samples will be collected in the Colville, Kettle, and/or Sanpoil rivers. All other sediment samples will be collected from the UCR, targeting sampling locations identified by the USEPA work group ~~that was lead by Whitney Fraser~~ (Fraser 2012). To expedite sediment sampling in the field, sampling stations will be broadly defined to include any location with acceptable material located within a 300-m radius of the designated coordinates. This will enable field personnel to investigate the sampling area and identify one or more locations with acceptable-looking material.

### 3.0 Sample Collection

At each sampling location, a total of 12 - 16 L of sieved sediment (i.e., < 2.00 mm in diameter) will be collected using a modified Besser Sampler (riverine portion of site) or a Van Veen Sampler (lacustrine portion of site; [Ingersoll et al. 2008](#)). A cultural resource expert will be included on each sampling team and that individual will be responsible for examining the materials that are collected at the station and determining if cultural resource issues are emerging. Alternate locations within a station will be sampled if directed by the cultural resource expert. Alternate stations will be sampled by the cultural resources experts indicates the need to do so. The actual coordinates where sediment samples were collected will be recorded for each sampling station. Following collection, sediment sampled will be transported to the field laboratory and held at 4°C in a mobile cooler or ~~refrigerationreefer~~ truck until they are shipped to the USGS Columbia Laboratory for processing.

### 4.0 Personnel Requirements

It is anticipated that there will be three crews established to facilitate collection and processing of sediment samples from the UCR. First, a riverine sampling team will be established to collect sediment samples from the sampling stations located between the Canada-United States border and Kettle Falls. This sampling team will consist of a boat operator, two sediment samplers, and a cultural resource expert. The lacustrine sampling team will collect sediment samples from the sampling stations located between Kettle Falls and the Grand Coulee Dam. This sampling team will consist of a boat operator, two sediment samplers, and a cultural resource expert. The third team, which will consist of a leader, an expeditor, and a GIS specialist will be responsible developing the sample manifest, coordinating sampling activities, receiving and storing sediment samples,

downloading and validating GIS data, shipping sediment samples, expediting, and other related tasks.

## 5.0 Budget and Funding

Funding for conducting the sediment sampling program is insufficient to complete all of the project tasks identified. For this reason, the tasks that will be undertaken with 2012 funding will include:

- \$ Development of the Sampling and Analysis Plan (FSP, QAPP, and HSP);
- \$ Project coordination and oversight;
- \$ Pre-sampling logistics;
- \$ Mussel toxicity testing;
- \$ Amphipod toxicity testing;
- \$ Midge toxicity testing;
- \$ Pore-water chemical analysis; and,
- \$ Sediment SEM-AVS analysis.

To complete these tasks with the available resources will require in-kind contributions by several organizations. To this end, the National Parks Service will committed a boat and operator, a cultural monitor, and two assistants to the sampling program for a period of two weeks. The U.S. Fish and Wildlife Service will commit two individuals for a period of two weeks. The Bureau of Reclamation and/or the Bureau of land Management will commit xxx people for a period of xxx weeks. Washington Department of Ecology will commit xxx people for a period of xxx weeks. The CCT and/or STI will commit xxx people for a period of xxx weeks. The budget for completing the tasks that will be undertaken using resources available in 2012 is presented in Table 1.

## 6.0 Deferred Tasks

Several additional tasks will need to be completed to ensure that the requisite data and information for evaluating the toxicity of UCR sediments to freshwater mussels are available. The tasks that will be deferred until 2013 funds become available will include:

- \$ Whole-sediment chemistry;
- \$ Slag characterization;
- \$ Database development;
- \$ Data report preparation; and,
- \$ Interpretive report preparation.

**Comment [CG12]:** I am least comfortable with this deferred cost. I think it would be more defensible to measure SEM and AVS when toxicity tests are conducted. This cost would be \$28K.

